



14 August 2006

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California Regional Water Quality Control Board
Central Coast Region
895 Aero Vista Drive, Suite 101
San Luis Obispo, CA 93401

Attention: Mr. Hector Hernandez

Sent by e-mail

Dear Mr. Hernandez:

**RE: REVIEW OF OLIN SECOND QUARTER 2006 GROUNDWATER
MONITORING REPORT**

On behalf of the City of Morgan Hill (City), WorleyParsons Komex has reviewed the report by Olin Corporation (Olin) titled "Second Quarter 2006 Groundwater Monitoring Report, Olin/Standard Fusee Site, 425 Tennant Avenue, Morgan Hill, California" (the Report). Our review focused on the components of the report related to the northeast flow situation wherein perchlorate from the Olin/Standard Fusee site (the Site) has impacted the municipal water supply of the City of Morgan Hill (the City). Our review does not reference the various other potential perchlorate sources which at this time have not been shown to either exist, nor to impact groundwater (in particular the Deep Aquifer), nor to impact any well operated by the City. In particular we reviewed in detail Appendix E, Northeast Groundwater Flow Assessment – Update (Appendix E). The main findings of our review are discussed below. For reader convenience, cited figures from the Report are enclosed with this document.

In the first quarter of 2006, Olin reported perchlorate detections at, or above 4 micrograms per liter ($\mu\text{g/L}$) in the Deep Aquifer Zone in four wells northeast of the Site: MP-04-251 (4.0 $\mu\text{g/L}$), MP-04-273 (4.2 $\mu\text{g/L}$), PZ-02-315 (4.0 $\mu\text{g/L}$) and PZ-03-427 (4.4 $\mu\text{g/L}$). Furthermore, perchlorate concentrations were increasing in three of four multiport wells and/or piezometers, and also in one of two piezometers in the Lower Deep Aquifer Zone. Clearly, this is a situation of grave concern to the City, since both the San Pedro and Condit wells are less than 2,000 feet from the location with the highest perchlorate detection (PZ-03-427), and these wells have been impacted by perchlorate from the Olin Site. Between 2003 and 2006 there were 14 perchlorate detections in the Condit well greater than 3 $\mu\text{g/L}$, and 12 detections in the San Pedro well. However, in spite of the significant detections of perchlorate in the northeast wells in the first quarter 2006, it appears that Olin did not sample in these wells in the second quarter 2006. The City was previously advised by RWQCB staff that it was the RWQCB's understanding that Olin would indeed do so. This needs to be remedied immediately with testing required forthwith and the results to be reported immediately after the laboratory results are received.



It would be a critical error to merely allow Olin to wait to take these samples in the next quarterly period and to report them in the quarter following that. That would effectively be 6 months from now.

Notwithstanding the lack of any perchlorate data from these wells, the water level data measurements taken by Olin again, for another consecutive quarter (now at least four consecutive quarters, from third quarter 2005) indicate groundwater flow to the north and northeast in the vicinity of the Site. Given this, the increasing numbers of wells northeast of the Site with perchlorate detections above 4 µg/L, the rising perchlorate concentrations in the northeast monitoring wells, and the recent discovery of J-Flag detections of perchlorate throughout the City's northeast wells, a substantial amount of data exist to confirm the northeast migration of perchlorate in groundwater originating from the Olin Site.

It is our opinion that additional investigation is not needed to prove this northeast migration. It is clear that the northeast plume of perchlorate is from the Olin Site, and certainly requires additional delineation in the Deep Aquifer zones in order to characterize the full extent of contamination and to develop a remedial strategy. The best regulatory approach to require complete characterization and clean up is by amending or issuing a Clean Up and Abatement Order to remove the arbitrary exclusion of the area north of Tennant Avenue.

Our review of the Report data has identified several key findings and data gaps, which are summarized below:

- 1) As noted above, the piezometers north and east of the Site were not sampled, or the locations were sampled and no data have been reported. The RWQCB should clarify or require that the piezometers, multiport wells and water wells northeast of the Olin Site are to be sampled on a quarterly basis.
- 2) The water level data contained in the Report illustrates a clear, consistent and irrefutable gradient in several Deep Aquifer zones to the north and even directly to the northeast in the Site vicinity. This is best reflected in Olin's Figures (Figure E5B, E5C and E13 from the Report [enclosed as Attachment A]). In Figures E5B and E5C, a gradient directly to the north and northeast from the Site is clearly shown in Olin's own interpretations, while the continuity of a northward gradient is reflected in Figure E13.
- 3) The text in the Report attempts to minimize the fact that there are north and northeastward gradients and makes statements directly in contradiction to the interpretation of water level elevations and resultant groundwater flow directions indicated in the figures cited in Comment #2 above. Although groundwater flow beneath, and in the immediate Site-vicinity in the Deep Aquifer is shown to be to the north and northeast as noted in Comment #2, the text of the Report in incorrectly states:

" Groundwater flow in all aquifers is to the southeast. ... This pattern has been repeatedly confirmed by annual monitoring conducted by the SCVWD and by evaluation of depth-specific groundwater elevation collected quarterly since late-2005 by MACTEC."

" Incorporation of data from wells located south of the Site along Fisher Avenue, allow for groundwater elevations to be contoured in the lower deep aquifer interval (Figure E5c). April



2006 data generally indicate an overall southward gradient; however, lower elevations measured at PZ-02 and PZ-03 indicate continued downward migration, presumably indicating flow toward deeper portions of the Subbasin”.

- 4) Olin, in the main body of the Report, states that for portions of the southern plume, the plume becomes homogeneous with distance, due to pumping influence. This statement, when applied to groundwater flow to the northeast from the Site, especially in proximity to City pumping wells, would result in a non-traditional dispersed plume. Therefore, it should not be expected that a traditionally distributed plume exists northeast of the Site, and the absence of any such distribution is still consistent with the Olin Site being the only source of perchlorate in City wells.
- 5) The City supports the RWQCB’s continued requirement for sampling certain onsite wells, especially well OW-01C. We strongly urge the RWQCB to reject Olin’s stated intention to disregard RWQCB directives, by ceasing to sample a number of onsite wells.
- 6) When the City performed testing on the Tennant well several years ago, Olin agreed verbally to monitor water levels at a high frequency in onsite wells to assess the potential hydraulic influence of Tennant well groundwater extractions. At that time, Olin did not monitor at a frequency high enough to allow any meaningful evaluation of this potential influence. Now, several years later, Olin contends that pumping the Tennant well is influencing groundwater flow in the near-site vicinity. This well now represents an important source of water within the City’s water supply system and the RWQCB has concurred with the City’s use of the well. In Olin’s discussion of the Tennant well pumping, there is selective and in some cases contradictory discussion of issues which Olin refers to throughout their quarterly report. Some examples, include the following statements from the Report,

”A strong vertical downward gradient in the northern portion of the Llagas Subbasin results from significant surface recharge and deep aquifer pumping in this area.”

“Approximately 57 feet of net lateral movement to the southeast in the B2-aquifer zone and approximately 138 feet of net lateral movement to the south-southwest in the B3-aquifer zone occurred between July 2005 and July 2006. Groundwater flow in the B3-aquifer began to shift from a south-southeast trajectory to the southwest in January 2005, apparently in response to initiation of pumping at the Tennant well in November 2004. The Tennant well is screened from 190 to 420 feet bgs and thus penetrates the lower portions of the B3 intermediate and the C-deep aquifer zones. Vertical movement of groundwater in the B2-, B3-, and C-aquifer zones beneath the Site was slightly downward (Figure 17) but only extended approximately 4 feet and 5 feet in the B2- and B3-aquifer zones, respectively. These results reflect lateral flow of groundwater through the aquifer zones and the relatively slow rate of vertical flow through the aquitard zones, which is due to the very limited vertical permeability of the aquitard sediments.”

”The consistently low onsite perchlorate concentrations in the middle and lower portions of



the intermediate aquifer appear to indicate that perchlorate is not migrating downward into the deep aquifer directly beneath the Site.”

”Despite the absence of perchlorate in the B2 and B3 aquifers, the strong downward vertical gradient between the intermediate and deep aquifers in this area has resulted in perchlorate migration into the deep aquifer immediately south of the Site. The resumption of pumping from the Tennant well appears to have resulted in increasing perchlorate concentrations in the middle portion of the deep aquifer beneath the Site.”

In addition, the discussion of the Tennant Well in the Report does not consider that the Tennant Well was only installed in 1979. As such, its influence on groundwater relative to the almost half-century of unabated migration from the Olin Site is relatively insignificant. If, as implied by Olin, the onsite groundwater remediation system is being successful at remediating groundwater in the B zones and as the Report states, “*perchlorate is not migrating downward into the deep aquifer directly beneath the Site*”, there should be relatively little mass of perchlorate remaining beneath, or near the Site for the Tennant Well to influence. When considering the much greater mass of perchlorate in the Deep Aquifer south of the Tennant Well (as shown in Figure 23 of the Report [enclosed as Attachment B]), where there are high concentrations of perchlorate in the Deep Aquifer at, and south of Fisher Avenue, pumping to the north might actually be helping to slow the spread of this highest-concentration region of Olin’s contamination. Further, there is no dispute that the City, on its own, is removing Olin’s perchlorate south of the Site.

- 7) It is unclear in the Report, but there are indications in some of the text that Olin is planning to discontinue monitoring water level elevations in the multi-port and piezometer monitoring points north and east of the Site in August, 2006, as reflected in the following statement:

”Groundwater elevations will continue to be recorded continuously until August 2006 using the data loggers and transducers installed at the four multi-level piezometers. Quarterly manual measurements will be taken until August 2006 at these piezometers and existing wells throughout the northeast study area.”

Given Olin’s recent decision not to sample these wells for perchlorate in the second quarter, it is critical that Olin continue this continuous monitoring and reporting at PZ/MP wells and manually in other surrounding wells for at least one year, and to consider expanding the continuous water level monitoring to deeper screens at the MW-16, MW-17 and MP-52 locations. Water level elevation data in addition to perchlorate concentration data are important to understanding plume migration and future effectiveness of remedial measures.

- 8) Olin alleges on p. 25 and p. 110 of the report that the City of Morgan Hill was late giving them information relative to the static ground water levels in City wells, therefore that information could not be incorporated into the Report. Actually, the first the City learned that Olin wanted the data was on 7/6/06, and the City produced the data on 7/12/06, even though the data request was substantially more than Olin had ever previously requested, i.e., data



for 3 min. intervals for the 3 month period from the City's electronic data logger and SCADA reporting system for the Nordstrom Well. Since we understand that all communications to or from Olin regarding their data requests are copied to RWQCB staff, we assume you also have the information to set the record straight on this matter, and on behalf of the City we respectfully request that you do so in your response to the Report.

WorleyParsons Komex is pleased to provide these comments to the RWQCB and we are at your disposal to discuss any of the responses above. If you have any questions or need additional information please call Jon Rohrer at (714) 379-1157 extension 241 or Mark Trudell at extension 161.

Sincerely,
WorleyParsons Komex

Jon Rohrer, PG, CHG.
Senior Hydrogeologist
enc.

Mark Trudell, Ph.D., PG, CHG
Senior Groundwater Modeler

cc: Mr. Steven Hoch, Hatch and Parent
Mr. Jim Ashcraft, City of Morgan Hill

Enclosures:

Attachment A: Report Figures E5B and E5C, showing groundwater elevations for the Deep Zone (Middle) and Deep Zone (Lower)

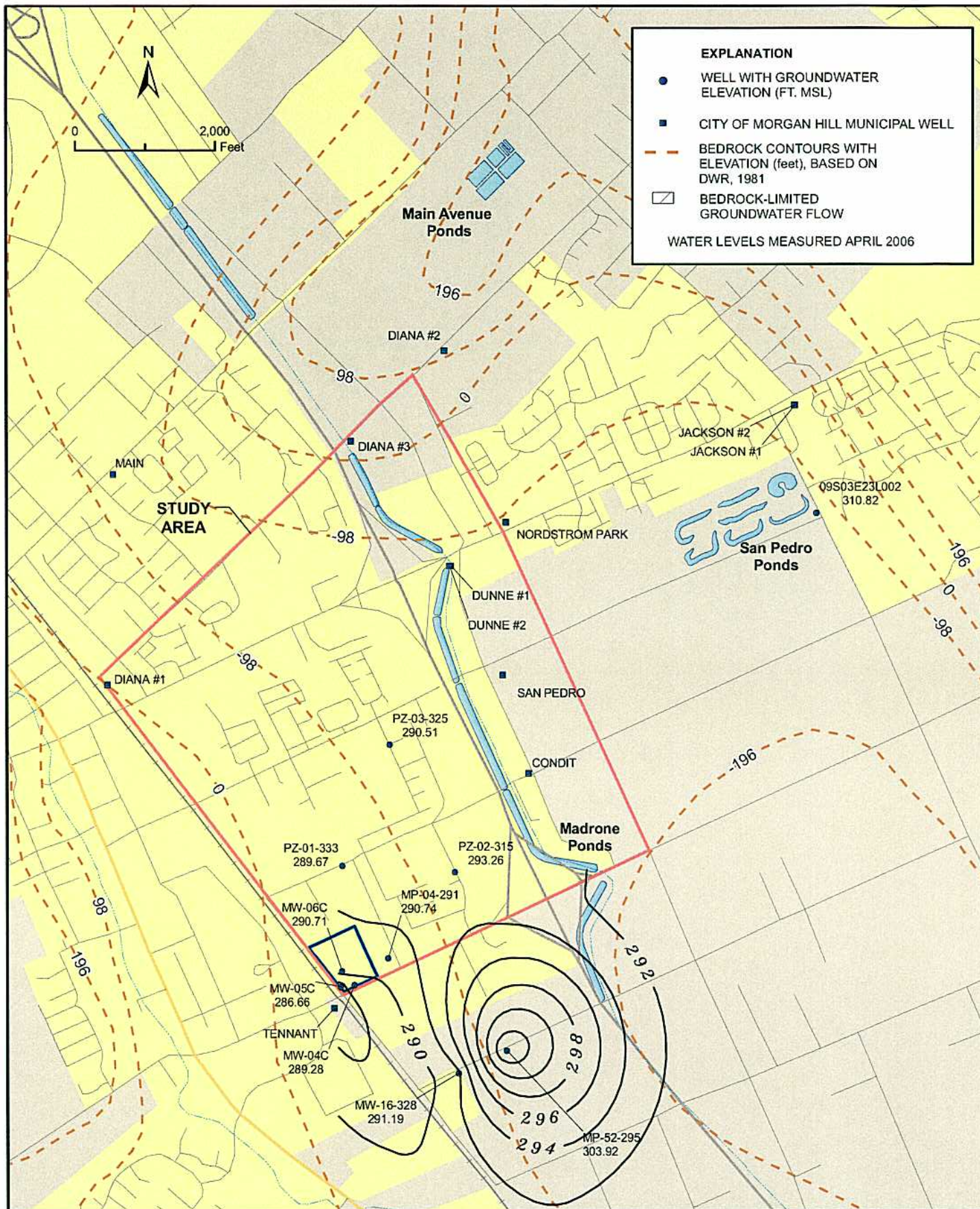
Attachment B: Report Figure 23, Illustrating Deep Aquifer Perchlorate Concentrations



WorleyParsons Komex

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ATTACHMENT A



Groundwater Elevations - Deep Zone (Middle)

Second Quarter 2006 Groundwater Monitoring Report
Olin/Standard Fusee Site
Morgan Hill, California

FIGURE

E5b

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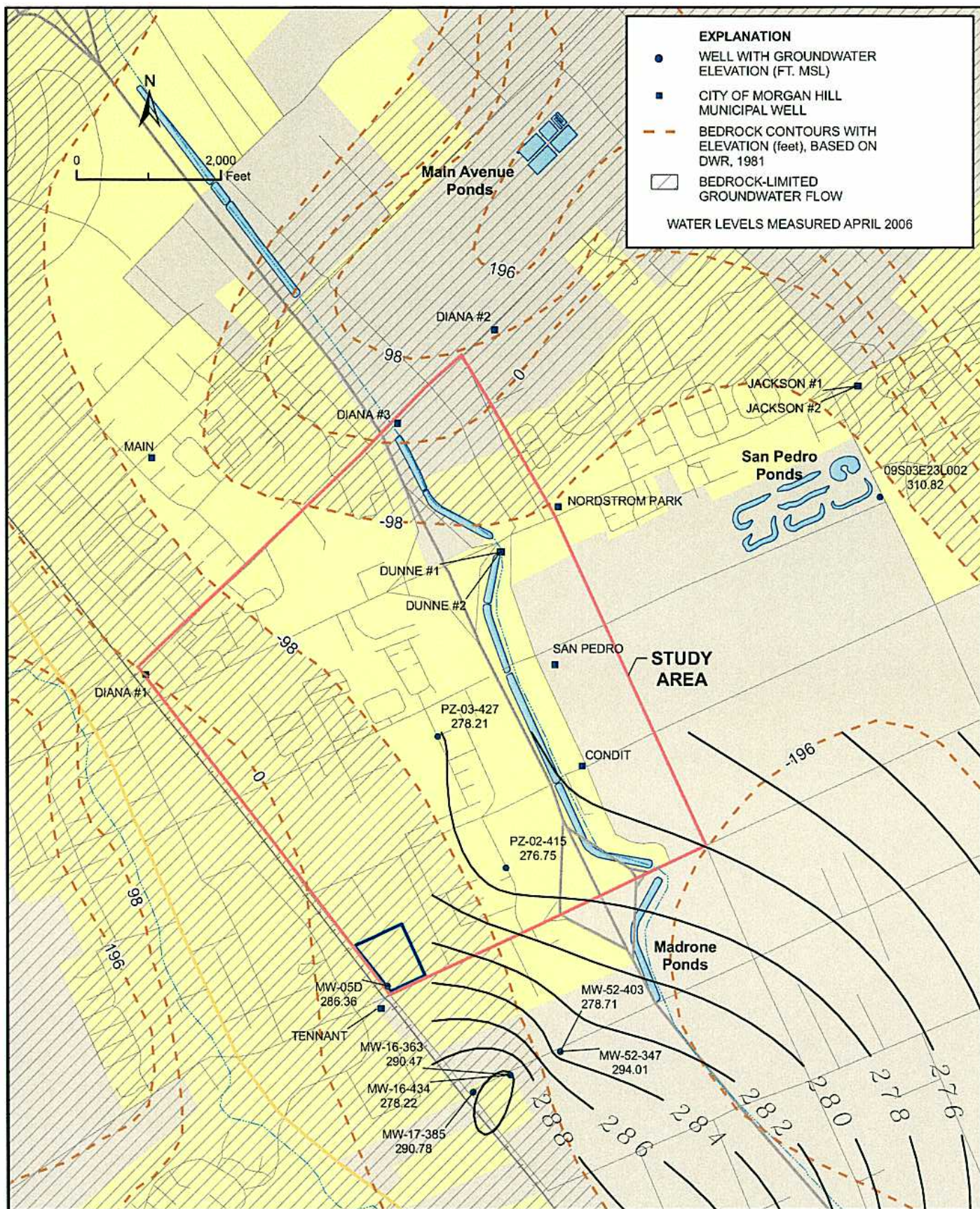
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Groundwater Elevations - Deep Zone (Lower)
 Second Quarter 2006 Groundwater Monitoring Report
 Olin/Standard Fusee Site
 Morgan Hill, California

FIGURE

E5c

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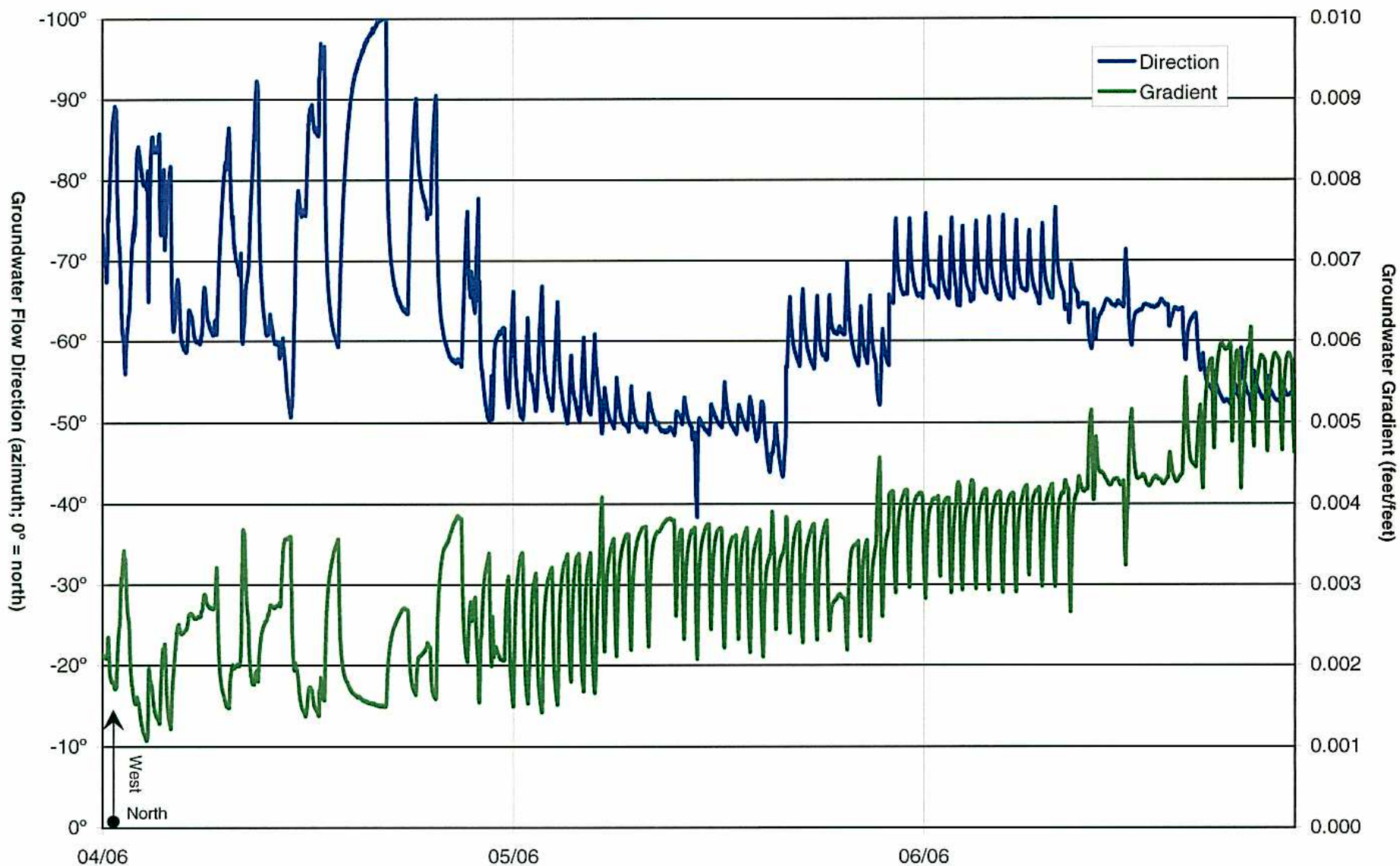
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**Groundwater Flow Directions and Gradients - Middle-Deep Aquifer
Second Quarter 2006 Groundwater Monitoring Report**

**Olin/Standard Fusee Site
Morgan Hill, California**

FIGURE

E13

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ATTACHMENT B

